

Water Conservation Potential and Performance of Soil Moisture Sensor Irrigation Controllers

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Abstract

More than 15% of all new homes in the U.S. were built in Florida between 2005 and 2006, most of them with an automatic irrigation system, resulting in an increase in the demand for limited potable water resources. Soil moisture sensor (SMS) irrigation control systems have recently been released to the market, which could help prevent excess irrigation. Each SMS system consists of a probe buried in the irrigated zone, and a controller that has a user-adjustable soil moisture content (θ_s) set point for irrigation bypass. The objectives of this research were to: a) determine a relationship between actual θ_s and the θ_s sensed by four commercially available soil moisture sensor controllers, and b) determine the proportion of scheduled irrigation cycles that the different SMS systems could bypass. Four commercially available SMSs (brands Acclima, Rain Bird, Irrrometer, and Water Watcher) were buried between 7 and 10 cm depth, on turfgrass plots, at the University of Florida, in Gainesville. In every plot, a calibrated ECH₂O probe was also installed, at the same depth, to continuously monitor θ_s . The θ_s sensed by the SMS systems were compared to the ECH₂O readings. Overall, only the Acclima controllers resulted in a highly predictable relationship between θ_s and the controller readings, followed by Irrrometer set at 1 day/wk frequency. Rain Bird and Water Watcher controllers did not produce readings related to θ_s . Despite the lack of correlation between controller readings and actual θ_s , all but the Irrrometer controllers reduced irrigation water 63% - 92%, when compared to a conservative homeowner time-based irrigation schedule without sensor feedback, while maintaining an acceptable turf quality.

Keywords: Soil moisture sensor, over irrigation, turfgrass, landscape, water conservation.

Challenges and Issues to be addressed: How new soil moisture sensor irrigation controllers can help prevent the excess use of potable water in urban irrigation.

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